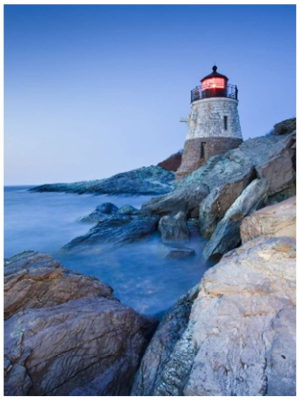
CHARLESTOWN



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Municipal Resilience Program

Community Resilience Building

Summary of Findings

October 2022

TOWN OF CHARLESTOWN

Town of Charlestown, Rhode Island
Community Resilience Building
Summary of Findings

Overview

The need for municipalities, regional planning organizations, corporations, states, and federal agencies to increase resilience to extreme weather events and a changing climate is strikingly evident amongst the communities across the state of Rhode Island. Recent events such as Tropical Storm Irene, Super Storm Sandy, severe winter storms (2013 & 2015), and even the recent severe flooding during the summer of 2022 (i.e., I-95 closure) have reinforced this urgency and compelled leading communities like the Town of Charlestown to proactively collaborate on planning and mitigating risks. Ultimately, this type of leadership is to be commended because it will reduce the vulnerability and reinforce the strengths of people, infrastructure, and ecosystems and serve as a model for other communities in Rhode Island, New England, and the nation.

In the summer of 2022, the Town of Charlestown embarked on certification within the state of Rhode Island's Municipal Resilience Program (MRP). As part of that certification, the Rhode Island Infrastructure Bank (RIIB) and The Nature Conservancy (TNC) provided the Town with a community-driven process to assess current hazard and climate change impacts and to surface projects, plans, and policies for improved resilience. In October 2022, Charlestown's Core Team helped organize a Community Resilience Building Workshop facilitated by TNC in partnership with RIIB. The core directive of this effort was the engagement with and between community members to define strengths and vulnerabilities and the development of priority resilience actions for the Town of Charlestown.

The Charlestown Community Resilience Building Workshop's central objectives were to:

- Define top local, natural, and climate-related hazards of concern,
- Identify existing and future strengths and vulnerabilities.
- Identify and prioritize actions for the Town.
- Identify opportunities to collaboratively advance actions to increase resilience alongside residents and organizations from across the Town, and beyond.

The Town of Charlestown employed an "anywhere at any scale", community-driven process called Community Resilience Building (CRB) (www.CommunityResilienceBuilding.org). The CRB's tools, reports, other relevant planning documents, and local maps were integrated into the workshop process to provide both decision-support and visualization around shared issues and existing priorities across Charlestown. The Charlestown Local Hazard Mitigation Plan (2016) and Comprehensive Plan (2021) were particularly instructive as references. Using the CRB process - rich with information, experience, and dialogue - the participants produced the findings presented in this summary report. This includes an overview of the top hazards, current concerns and challenges, existing strengths, and proposed actions to improve Charlestown's resilience to hazards and climate change today, and in the future.

The summary of findings transcribed in this report, like any that concern the evolving nature of risk assessment and associated action, is proffered for comments, corrections and updates from workshop attendees and other stakeholders alike. The leadership displayed by the Town of Charlestown on community resilience building will benefit from the continuous participation of all those concerned.

Summary of Findings

Top Hazards and Vulnerable Areas for the Community

Prior to the CRB Workshop, the Charlestown Core Team identified the top hazards for the Town. The hazards of greatest concern included sea level rise, storm surge, and high wind events associated with Nor'easters and hurricanes. Additional hazards highlighted by participants during the workshop included extended periods of drought, large winter storms and/or Nor'easters, riverine flooding, and extended cold snaps and heat waves. These hazards have direct and increasing impacts on the infrastructure, environment, and residents of Charlestown as well as seasonal visitors and tourists. These effects are seen in residential areas, natural areas (coastal wetlands, rivers/streams, forests, preserves, coastal ponds), roads, bridges, businesses, transportation, municipal facilities, churches, social support services and other critical infrastructure and community assets within Charlestown.

Current Concerns and Challenges Presented by Hazards

The Town of Charlestown has several concerns and faces multiple challenges related to the impacts of natural hazards and climate change. In recent years, Charlestown has experienced a series of highly disruptive and damaging weather events including severe flooding (March 2010, FEMA DR-1894), Tropical Storm Irene (August 2011, FEMA DR-4027), Superstorm Sandy (October 2012, FEMA DR-4089), Nor'easter Nemo (February 2013, FEMA DR-4107), and Blizzard Juno (January 2015, FEMA DR-4212). Impacts from Irene and Sandy included widespread coastal and inland flooding along with tree damage and power outages. The winter storms Nemo and Juno dropped 2-3 feet of snow with 2-3 inches per hour of accumulation at their peak. The magnitude and intensity of these events and others across Rhode Island have increased awareness of natural hazards and climate change, while motivating communities such as Charlestown to proactively improve their resilience.

This recent series of extreme weather events highlight that the impacts from hazards are diverse, ranging in Charlestown to include coastal flooding of critical infrastructure, roads, and low-lying areas; localized flooding from stormwater runoff during intense storms and heavy precipitation events; and property damage and utility outages (lasting several days or more) from wind, snow, and ice. Longer periods of elevated heat, particularly in July and August, have raised concerns about vulnerable segments of the population including elderly and disabled residents. The combination of these issues presents a challenge to preparedness and mitigation priorities and requires comprehensive, yet locally specific actions in Town.

The workshop participants were generally in agreement that Charlestown is experiencing more intense and frequent storm events and heat waves. Additionally, there was a general concern about the increasing challenges of being prepared for the worst-case scenarios (e.g., major thunderstorms and hurricanes (Cat-3 or above)) particularly in the late summer and in the fall/winter months when more intense storms coincide with colder weather (i.e., Nor'easters). The impact of the current Covid-19 pandemic was raised by workshop participants as well.

Specific Categories of Concerns and Challenges

As in any community, Charlestown is not uniformly vulnerable to hazards and climate change, and certain locations, assets, and populations have been and will be affected to a greater degree than others. Workshop participants identified the following items as their community's key areas of concern and challenges across several broad categories.

Roads, Bridges, Road Networks, & Dams:

- Growing number of roadways with undersized culverts are not able to convey the increased stormwater volumes from more intense and longer duration precipitation events.
- Devastation of property and infrastructure during Superstorm Sandy south of Route 1 which raises significant concerns about the growing potential for storms of equal or greater magnitude occurring more frequently.
- Route 1 not at an adequate elevation to be a reliable egress and access corridor during major flooding events (i.e., Superstorm Sandy, among other recent examples).
- In Carolina, RIDOT just finished replacing the bridges that carry Route 112 over the Pawcatuck and the Old Mill race and eliminated a storm drain in the process. There is concern this will cause flooding on Route 112.
- Main roads through Charlestown are state roads, so Town has less control over maintenance and improvement schedules and work conducted.
- Car-centric infrastructure with lack of sidewalks and trails for alternative transportation.

Electric Grid:

- Concerns regarding the ability of the current electrical grid to withstand major storm events including events with the magnitude of the recent Hurricane Ian.
- No clear understanding at the municipal level where the greatest vulnerability currently exists for the electrical grid and where undergrounding of electrical lines would provide the greatest benefit to stability in the grid during and after major events.

Specific Categories of Concerns and Challenges (cont'd)

Stormwater, Waste Systems, Drinking Water Supply:

- Ongoing issues with private drinking water wells running dry during the late summer after longer and hotter periods.
- Concerns about the ability of the drinking water aquifer below Charlestown to provide all the needed resources for current population levels and densities let alone future build out given the mounting negative impact of droughts.
- Currently, there is no municipal drinking water infrastructure for residents and visitors.
- Increasing amount of saltwater intrusion into underground infrastructure and private drinking water wells south of Route 1.
- Reduced reliability of private drinking water wells during extended periods of drought.
- No centralized sewer systems with individual septic systems for each developed parcel in Charlestown.
- Above grade septic systems in coastal low-lying areas heavily impacted during Superstorm Sandy.
- Loss of power results in lack of ability to get drinking water from private and commercial wells.
- As sea levels rise, coastal groundwater levels increase resulting in reduced treatment and functionality of septic systems.
- Coastal areas with septic systems are more at risk than inland septic systems due to storm surge and saltwater intrusion that elevated groundwater levels including all septic systems on Charlestown Beach Road, among other locations (see areas south of blue outline on Red Group's base map (Appendix C)).
- Areas north of Route 1 has a low groundwater table and are increasingly susceptible to impacts of drought.

Other Infrastructure & Development:

- Permitting and construction of developments that are in low lying, higher risk locations that place greater burden on the municipality for public health and safety service requirement (i.e., Foster Cove neighborhood).
- Concern that Kenyon Mill in the village of Carolina may be vulnerable to flooding or have contaminants being washed into the Pawcatuck River.

Specific Categories of Concerns and Challenges (cont'd)

- Ongoing risk to infrastructure related to beach access and use including access roads (i.e., West Beach Road, East Beach Road), the beaches themselves due to erosion (i.e., Charlestown Beach (town-owned), Blue Shutters Beach (town-owned), East Beach (state-owned)), parking lots, pavilions, restrooms, among other facilities and amenities. Decline in access and quality of experience may have direct impacts on local economy.

Emergency Management and Preparedness:

- Rapidly aging population of residents that have limited mobility and are increasingly isolated during and after disasters.
- Growing concerns regarding access and egress to Charlestown Beach Road during emergencies.
- Problematic positioning of Route 1 and adjoining road networks leads to limited ability for access and egress during major storm events.
- Only one pharmacy in Charlestown, and it is situated south of Route 1.
- Nearest urgency care facility located in Westerly near Route 1.
- Concerns about extensive flooding potential at Kenyon Industries property.
- New police station was just built south of Route 1 which is an area at higher risk from multiple hazards.
- Particularly vulnerable neighborhoods include Churchwoods Apartments on Old Post Road (55+) and trailer parks on Old Mill Road and Route 112. Also, concerns with aging population in the Quonnie neighborhood which may not have the resources needed to rebuild or complete repairs after major storms.
- Ongoing flooding issues present challenges to specific locations including Route 1 (i.e., summer 2022), Fire Station on East Beach Road, and along Old Coach Road due principally to inadequate stormwater drain systems that are unable to convey increasingly more intense precipitation events.

Municipal Functions, Operations, & Growth:

- Decline in the number of volunteers for critical municipal functions such as at the Fire Department as well as on various boards and commissions. Volunteers are currently primarily young people without families or older people past retirement (i.e., people without children).
- No public transit option of any type for residents in Charlestown including seniors.

Specific Categories of Concerns and Challenges (cont'd)

- Coastal areas with higher risk from hazards represent large portion of tax base in Charlestown.
- Senior Center is located within the coastal zone and is therefore at higher risk from hazards then more inland locations.
- Increasing costs of post-storm clean-up with much of the work being conducted by volunteers.
- Understaffed state agencies mean not enough technical assistance for Town to comply with state regulations.
- Charlestown has unique challenges in the quantity of land controlled by the state.
- Lack of formal town center viewed as a vulnerability.
- Impacts to business community south of Route 1 and subsequent tax base in the aftermath of Superstorm Sandy.

Coastlines, Watersheds, Waterways, Open Space, Forests, Trees:

- Groundwater resources impacted by recent droughts resulting in private drinking water wells going dry.
- Coastal barriers and associated marshes have been over washed more frequently in recent decades and have developed vulnerable points in this natural line of defense for people and property during major storm surge events.
- Reluctance to allow natural breaches in coastal barriers to occur and remain along with resistance to the inland movement of the barrier island resulting in an untenable and expensive proposition longer term for the municipality and private property owners adjoining this low-lying, coastal system.
- Concerns that ongoing and future droughts will increase the likelihood of forest fires that will threaten people and property in Charlestown and the surrounding municipalities.
- Expensive storm debris recovery operations conducted in the coastal ponds due to navigation hazards presented by debris.
- Charlestown breachway is experiencing siltation in the main channel at rates faster than the ability of municipality to dredge it out. West side of breachway is in a concerning state of disrepair.
- Salt marshes on back side of barrier beach and northern edge of Ninigret Pond are vulnerable to sea level rise and require space to advance upslope, which is limited.

Specific Categories of Concerns and Challenges (cont'd)

- Barrier beach is mostly owned and managed by the state's Department of Environmental Management and the US Fish & Wildlife Service despite being the primary line of defense for the municipality of Charlestown against major storm and hurricanes.
- Combination of drought and development putting more stress on aquifer.
- Overuse of lawn sprinklers during summer drought can cause water shortages in adjacent neighborhoods.
- Salt Ponds (i.e., Ninigrit, Quonochontaug, Green Hill) vulnerable to increases in water temperatures and nutrient overloading from septic systems and fertilizer which collectively jeopardizes these critical nurseries for fish and shellfish and diminishes the recreational experience for residents and tourists.

Credit: Charlestown, RI

Credit: Getaway USA

Credit: The Providence Journal

Current Strengths and Assets

Just as certain locations, facilities, and populations in Charlestown stand out as particularly vulnerable to the effects of hazards and climate change, other features are notable assets for Charlestown's resilience building. Workshop participants identified the following items as their community's key strengths and expressed interest in centering them as the core of future resilience building actions.

- Clearly, the responsive and committed engagement exhibited by leaderships, staff, and residents is a very appreciated strength within and across Charlestown. Ongoing collaboration between municipal staff, committee/commission volunteers, business community, NGOs, adjoining municipalities, and various state-level organizations, among others, on priorities identified herein will help advance comprehensive, cost-effective, community resilience building actions.
- Municipal staff have good working relationships and problem-solve across various Departments effectively and efficiently (i.e., "not siloed").
- Chariho Emergency Shelter is available for use by Charlestown residents during major events, however it is not located within the municipality.
- Fire Department run and managed by volunteers from the community coupled with an active Community Emergency Response Team (CERT).
- Coastal barriers, salt ponds (i.e., Ninigrit, Quonochontaug, Green Hill) and associated marsh systems provide natural storm surge break (horizontal levee) that help naturally increase the resilience of the built environment (people, property, supporting infrastructure) situated in low-lying areas landward of these coastal wetland features.
- Deep experience and knowledge of the community challenges and opportunities amongst staff with ongoing coordination across various departments including leadership, Public Works, Police, and Fire was cited as a highly valued community strength.
- High quality and expertise of staff across many Departments including GIS, Planning, and Public Works Department.
- Rural community with relatively small population and pockets of development surrounded by conserved or undeveloped land which is inherently less vulnerable to storms since it protects wetlands, provides flood storage, and cleans water and air.

Current Strengths and Assets (cont'd)

- Charlestown Beach facilities designed and built to standards that exceeded requirements resulting in structures that will most likely withstand intense wind and flooding from major storms today and in the future.
- Special Needs Registry for seniors and people with disabilities which is used by first responders before, during, and after major events to ensure the health and safety of these residents.
- Second homeowners and tourists provide an economic benefit to the Town and generally do not require municipal service during the winter months.
- Large amounts and clusters of conserved lands which offer natural risk reduction from hazards such as heat waves, storm surge, and riverine flooding.
- Residents are installing cisterns to capture precipitation due to the declining availability of below ground water via private wells.
- Location of Rhode Island's only commercial composting facility, Earth Care Farm, within Charlestown.
- Presence of the Narragansett Tribe and sovereign lands adjoining Charlestown.
- Kenyon Mill in the village of Carolina is a tourist draw.
- Proactive approach to septic system standards which serves as a model for other municipalities in Rhode Island.
- Outstanding library that seeks to provide services that connect with and help residents as well as the entire community.
- Property taxes are viewed as relatively low in comparison to other coastal communities in Rhode Island.
- Generally high public awareness and appreciation for natural resources amongst residents.
- Residents are knowledgeable about how to prepare for storms and power outages for periods up to 72 hours.
- Relatively low impervious cover percentages with relatively low rates of development.

Recommendations to Improve Resilience

A common theme among workshop participants was the need to continue community-based planning efforts focused on developing adaptive measures to reduce Charlestown's vulnerability to extreme weather, climate change, and other common concerns raised. To that end, the workshop participants helped to identify several priority topics requiring more immediate and/or ongoing attention including:

- **Long-term vision and growth** (i.e., responsible/sustainable growth, volunteerism, conservation & recreation, increased tax base, development north of Route 1);
- **Infrastructure improvements** (i.e., road/bridge network, stormwater management systems, green stormwater infrastructure, beach facilities, breachway);
- **Quality of life improvements** (i.e., parks and recreation, open space & accessibility, sustainability, health & safety, economic prosperity, localized healthcare);
- **Emergency management** (i.e., evacuation, communications, outreach, education, continuation of services, business recovery, sheltering, vulnerable populations).

In direct response, the workshop participants developed during the Community Resilience Building workshop the following actions identified, but not ranked, as either priority or as additional actions. Mitigation/adaptation actions from the Charlestown Natural Hazard Mitigation Plan (2016) are provided in Appendix A for cross reference.

Priority Actions

- Complete cost benefit analysis of various investment options for Charlestown Beach Road given the fact that 1) sea level rise coupled with storm surge present ever-escalating, cost prohibitive barriers to repetitive rebuilding activities and 2) access and egress can be limited during major storms or flooding events.

- Create a better way to solicit and secure community feedback on various issues and opportunities that genuinely represent perspectives from the entire town, not just a few individuals. Potential approaches to consider include focus groups as well as a system for statistically valid "rapid polling" of community members.

Priority Actions (cont'd)

- Create plan for managed retreat via voluntary buyouts in the barrier beach area to avoid the "big hit" where an entire community is impacted all at once (refer to New Jersey Blue Acres program). In lock step, identify measures to raise the elevation of the barrier beach areas through native vegetation planting and natural erosion controls approaches.

- Increase the number of storm shelters outside of hazardous areas via retrofit or new construction that are equipped with showering and food preparation facilities which can accommodate longer-term stays for those in need in anticipation of storm events of greater magnitude with extended recovery phases. Additional ancillary sheltering facilities should be located north of Route 1 to avoid placing more structures in high-risk areas (i.e., south of Route 1).

- Create a real estate transfer tax to augment the municipal budget and help fund resiliency projects related to needed infrastructure improvements.

- Conduct an engineering feasibility study to move the entrance booth to the Charlestown Breachway (state-owned land) inland to allow portion of retreated dune line to get restored as well as considering the replacement of the building with something moveable.

- Develop a comprehensive forest management plan for Charlestown that incorporates the need to address dead and standing tree issues along transportation routes and hire a town arborist to manage plan implementation (position open currently, but not filled).

- Identify and design priority state and municipal roadway segments within Charlestown to withstand increasingly impactful flooding. Designs should include the elevation of select road segments (i.e., Klondike area above Blue Shutters, segments of Route 1, Kings Factory Road, Shannock Road, among others) to Category-5 hurricane flood levels where feasible as well as stormwater management improvement via culvert replacements in adjoining, hydrologically connected locations.

Priority Actions (cont'd)

- Upgrade septic systems to be more resilient to sea level rise and rising groundwater tables by encouraging best septic system practice and advancing recommendation to modify state regulations for onsite wastewater treatment systems (OWTS). Recommended modifications should include use of concrete foundation or more resilient materials (versus using timbers to box in OWTS which become projectiles during storms) in the systems to prevent impacts to adjoining properties and ecosystems. In addition, create a database of properties likely to have flooded septic systems to make sure testing at proximity drinking water wells occurs after flooding.

- Work with the utility to identify high risk sections of above ground powerlines that would help to strengthen the overall system and help minimize power outages if safely placed underground.

- Develop a comprehensive approach to barrier beach dune restoration and marshland system restoration, enhancement, and upslope advancement as an integrated, living system (beach/dune and marshes) helping to reduce the risk to people and property. Approach should include education and outreach to residents and tourist on minimizing impacts through various activities (i.e., beach buggies driving on dunes, etc.).

- Assess capacity and vulnerability of aquifers and potable water currently and under various climate scenarios in decadal time steps. Utilize results of analysis to rethink location and capacity of storage tanks as well as increase education of residents on sustainable water use practices at the household and business scale.

- Continue to seek ways for private property owners to proactively reduce the impact of downed trees and limbs on the electrical power grid which will help reduce power outages and help residents remain safe during and after major events.

- Increase focus on stormwater management in collaboration with state and non-profit partners to ensure green stormwater infrastructure and best management practices are incorporated into all new development and any redevelopment or retrofits, where feasible.

Additional Actions

- Continue to keep the senior citizen emergency response directory updated to ensure timely and efficient responses by emergency management personnel.

- Look to conduct more festivals and public events in the Ninigret area to help increase municipal revenue to help cover the cost of or provide match for resiliency projects in the event the coastal tax base is reduced due to the elimination of coastal property in the aftermath of repetitive major disasters.

- Work to identify and strengthen key access roads on and off Route 1 to help assist with evacuation and storm response needs and operations.

- Encourage residents and business owners to shift investment/development focus away from south of Route 1 to north of Route 1. Emphasis should be placed on locations well away from risky low-lying coastal areas (south of Route 1) already subjected to flooding from sea level rise coupled with impacts from storm surge.

- Explore the potential of establishing a special tax rate increase for privately-owned structures south of Route 1 to help offset the cost of ever-increasing rebuilding costs for buildings and supportive infrastructure such as roadways and bridges in the aftermath and storm events.

- Establish a funding source to match federal funds to help acquire properties (i.e., voluntary buyouts) that have been compromised due to storm events (wind, flooding, etc.) and ensure the vacated properties remains undeveloped as a storm buffer for adjoining areas and other properties at risk.

- Offer municipal incentives for residents to help subsidize the cost of generators at the household level to increase self-reliance and help alleviate the pressure on emergency management professionals during recovery activities.

Additional Actions (cont'd)

- Explore the potential and feasibility for expanding the width and depth for Charlestown Breachway to help reduce the time between maintenance dredging operations.

- Review dredging strategy and management in hopes of increasing efficiency and sustainability longer-term.

- Explore proactive strategy for post-storm recovery including feasibility study for planning managed retreat for vulnerable properties.

- Define the potential options to increase space at Town beaches via shuttles to reduce traffic and need for parking.

- Improve access road to state beach including formalizing coordination on plan for East Beach Road and Town Beach Road including evacuation signs.

- Address water quality issues in coastal ponds by improving circulation and flushing and reduction in inflows from septic systems and use of fertilizer on lawns in proximity to the ponds.

- Maintain road access to boat launch.

- Create a Charlestown storm contingency and resilience fund to help with recovery and preparedness costs.

- Strengthen and build collaboration with the Narragansett Tribe on concerns, opportunities, and actions as well as increase municipal awareness of tribal protocols and resource needs during challenging times.

- Conduct regular outreach on evacuation plans in high-risk communities coupled with education on steps to improve the overall, long-term resilience of properties, neighborhoods, and the municipality.

Additional Actions (cont'd)

- Work with Rhode Island Department of Transportation to ensure paving projects include stormwater retrofits to accommodate increasingly intense and longer duration precipitation events.

- Consider creating a Sustainability and Resilience Officer staff position to manage resilience related activities and projects in Charlestown.

- Explore the extent and depth of inundation at Ninigret Park by 2100 using StormTools and develop a management plan to accommodate future inundation, where feasible.

- Assess how vulnerable private drinking water wells are to saltwater intrusion and drought coupled with an exploration of how other coastal communities are working to develop solutions to potentially devastating impact on this critical resource for Charlestown.

- Increase the pace and extent of acquisition of undeveloped parcels with forests and wetlands to help increase the overall natural resilience of Charlestown via reduced heat waves, drought conditions, and flood attenuation, among other benefits provided by natural asset.

- Continue to conduct invasive species removal and/or control at various locations across Charlestown including the playground area at Ninigret Park, roadsides with Japanese knotweed, forestland threatened by gypsy moth, and Ninigrit pond which now has sea nettles and clinging jellyfish, among other invasive species.

- Research how watersheds in the area are designated in relation to total maximum daily loads (TMDL) to find out if there are any places where degraded conditions can trigger better stormwater management practices and implementation projects.

- Identify alternative water source(s) north of Route 1 for Quonnie and other coastal communities with conservation measures in place to restrict watering lawns and other wasteful practices.

Additional Actions (cont'd)

- Conduct detailed and thorough engineering analysis of the hydrologic dynamics (impoundments, restricted flushing, flooding) of the West Beach Road salt marsh system in hopes of developing mechanisms to allow the marsh to flourish and at the same time minimizing flooding of adjoining residential structures.

- Develop operational plan to provide potable water to residents in need during heat waves.

- Continue to prioritize the protection of undeveloped lands in proximity to and surrounding municipal-owned drinking water wells.

- Engage with neighboring municipalities regarding priority actions generated during Community Resilience Building workshops in hopes of fostering more regional approaches and projects over time.

- Continue to work directly on the actions identified in Charlestown's Local Natural Hazard Mitigation Plan and conduct a cross walk with priority actions generated during the Community Resilience Building workshop.

- Continue to discourage additional development and/or redevelopment in flood-prone areas coupled with the preservation of forests, open space, and floodplain to further reduce the hazard risk profile of Charlestown.

- Encourage state to update regulations to recognize the threat of rising groundwater when approving septic systems. Encourage state to include this in their floodplain maps if FEMA will not.

- Explore the potential for creating a "town square" in the center of Charlestown coupled with the development of a state-of-the-art community center.

- Create sidewalk paths to encourage walking and biking to increase health and well-being of residents and visitors as well as supporting alternate forms of transportation.

CRB Workshop Participants: Department/Organization

Town of Charlestown – Town Administrators Office
Town of Charlestown – Town Councilmember Representation
Town of Charlestown – Emergency Management Department
Town of Charlestown – Parks and Recreation Department
Town of Charlestown – Geospatial Information Systems Department
Town of Charlestown – Climate Resiliency Commission
Town of Charlestown – Planning Commission
Town of Charlestown – Conservation Commission
Town of Charlestown – Wastewater Management Commission
Town of Charlestown – Coastal Pond Management Commission
Town of Charlestown – Affordable Housing Commission
Town of Charlestown - Residents
Charlestown Land Trust
Charlestown Salt Pond Coalition
Save the Bay

Charlestown Core Project Team

Victoria Gu – Charlestown Climate Resiliency Commission
Sarah Racine – Charlestown Climate Resiliency Commission
David Prescott – Charlestown Climate Resiliency Commission
Christopher Fox – Charlestown Climate Resiliency Commission
Cynthia Drummond – Charlestown Climate Resiliency Commission

CRB Workshop Facilitation Team

Rhode Island Infrastructure Bank - Kim Korioth (MRP Lead)
The Nature Conservancy - Adam Whelchel. Ph.D. (Lead Facilitator)
The Nature Conservancy - Sue AnderBois (Small Group Facilitator)
University of Rhode Island – Pam Rubinoff (Small Group Facilitator)
The Nature Conservancy – Sheila Dormody (Small Group Facilitator)
The Nature Conservancy - Kai Lo Muscio (MRP Coordinator/Scribe)
Rhode Island Infrastructure Bank – Paige Myatt (Scribe)
University of Rhode Island – Isabel Whaling (Scribe)
The Nature Conservancy – Tim Mooney (Scribe)

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Appendix A

Town of Charlestown
Local Hazard Mitigation Plan
(2016)

Mitigation Actions

5.3 Planning Recommendations

PR#1: Increase circulation of The Pipeline to realtors, campgrounds, public venues and other affected citizenry. (The Pipeline is a printed and electronic newsletter that is provided by the Town of Charlestown to share critical emergency information with residents and visitors.)

- Priority Score: High
- Lead: Administrator's Secretary
- Supporting: CEMA, Building/Zoning Department, Wastewater Department
- Time Frame: Short Term
- Financing Options: Town Budget
- Cost Estimate: < $10,000/year
- Benefit: Strengthen citizen participation and commitment to disaster recovery processes. Protection of life and property.

PR#2: Based on the work of the Potable Water Working Group, delineate the critically impacted groundwater protection zones and coordinate the implementation of drinking water protection programs and policies related to OWTS, stormwater control, use of fertilizer and responses to sea level rise and climate change through public information materials.

- Priority Score: High
- Lead: Wastewater/Environmental Department, Planning Department
- Supporting: GIS, Administration
- Time Frame: Long Term
- Financing Options: Town Budget, Grants, URI Cooperative Extension (NEMO)
- Cost Estimate: <$10,000
- Benefit: Protect public health safety and welfare by mitigating impacts to potable groundwater resource in critically impacted zones of town.

PR#3: For municipal roads that intersect sea level rise scenarios, evaluate the long term viability by determining necessary redesign requirements to maintain this infrastructure over the long-term.

- Priority Score: Low
- Lead: Public Works Department
- Supporting: GIS
- Time Frame: Long Term
- Financing Options: RIEMA, FEMA, EPA
- Cost Estimate: $10,000 - $50,000
- Benefit: Protect life and property. Reduce areas subject to flooding. Reduce cost of repair to transportation infrastructure

PR#4: Develop sedimentation and erosion control plan in accordance with the RI Soil Erosion & Sediment Control Handbook.

- Priority Score: Medium
- Lead: Planning, Wastewater/Environmental Department
- Supporting: Wastewater Management Commission, Planning Commission, Town Council
- Time Frame: Medium Term
- Financing Options: Staff Time
- Cost Estimate: <$10,000
- Benefit: Reduces property losses and improves resiliency particularly in the coastal zone.

PR#5: Limit the percentage of allowable impervious surface within developed parcels by amending the zoning ordinance to include total lot coverage standards.

- Priority Score: Medium
- Lead: Planning Department and Building/Zoning Department
- Supporting: Planning Commission, Town Council
- Time Frame: Medium Term
- Financing Options: Staff Time
- Cost Estimate: <$10,000
- Benefit: Reduces stormwater runoff and flooding, in developed areas, protects water quality.

PR#6: Through ordinance amendment, require all new critical facilities including emergency operations centers (EOC), police stations, and fire departments to be located outside of flood-prone areas, including the 500-yr floodplain.

- Priority Score: High
- Lead: Building/Zoning Department, Town Council
- Supporting: CEMA, Administration
- Time Frame: Short Term
- Financing Options: Staff Time
- Cost Estimate: <$10,000
- Benefit: Protection of community assets

PR#7: Modify subdivision regulations to include granting of easements for fire breaks and installation of concrete water storage tanks for firefighting purposes.

- Priority Score: Medium
- Lead: Planning Department, Building/Zoning Department
- Supporting: Town Council and Planning Commission

- Time Frame: Long Term
- Financing Options: Staff Time
- Cost Estimate: <10,000
- Benefit: Protect life and property

5.4 Mitigation Actions

Action #1
Pilot projects targeted to the community regarding groundwater (drinking water) protection and conservation of water resources including promoting rain water infiltration and harvesting by the installation of rain barrels, and landscape conservation by reducing impervious cover in critically impacted portions of the Watershed.

- Priority Score: Low
- Lead: Wastewater / Environmental Department
- Supporting: GIS, Wastewater Management Commission
- Time Frame: Long Term
- Financing Options: Budget, Grants, URI and State Agencies
- Cost Estimate: >$100,000
- Benefit: Protection of public health safety and welfare through potable water resource impact mitigation

Action #2
The Town will sample private wells to determine levels of risk in densely developed areas of Charlestown. Groundwater nitrogen concentrations in densely developed areas of Charlestown commonly exceed the EPA action limit for drinking water of >0.5 parts per million (ppm) and in some areas exceed the drinking water thresholds of 10 ppm, representing a public health hazard.

- Priority Score: Low
- Lead: Wastewater / Environmental Department, Wastewater Management Commission
- Supporting: Finance, Administration, RIDEM, RICWFA, RI Housing
- Time Frame: Long Term
- Financing Options: Town Budget
- Cost Estimate: $10,000 - $50,000
- Benefit: Protect public health, safety and welfare through the mitigation of wastewater impacts to the potable groundwater resource. Further, improve the aquatic health of surface water bodies.

Action #3
To assist homeowners with costs associated with the design and installation of updated on-site wastewater treatment system (OWTS), the Town will offer low interest loans to qualifying homeowners under the Community Septic System Loan Program.

- Priority Score: High
- Lead: Wastewater / Environmental Department, Wastewater Management Commission
- Supporting: Finance, Administration, RIDEM, RI Infrastructure Bank (RICWFA), RI Housing
- Time Frame: Long Term
- Financing Options: State Revolving Fund Financing
- Cost Estimate: >$100,000
- Benefit: Protect public health, safety and welfare through the mitigation of wastewater impacts to the potable groundwater resource. Further, improve the aquatic health of surface water bodies.

Action #4
RIDEM requires the use of nitrogen (N)-reducing OWTS in the coastal watershed for all new OWTS installations. Discharge from these systems often exceeds the discharge threshold limits. The Town will establish a program to monitor N-reducing OWTS to facilitate optimization and reduction of nutrients to the drinking water to mitigate public health hazards.

- Priority Score: Low
- Lead: Wastewater / Environmental Department, Wastewater Management Commission
- Supporting: Finance, Administration, GIS
- Time Frame: Long Term
- Financing Options: Town Budgetary Process, Grants
- Cost Estimate: >$100,000
- Benefit: Protect public and environmental health by nutrient reduction of drinking water and surface water bodies in critically impacted zones of town.

Action #5
Create a GIS map of the entire drainage system and list of components.

- Priority Score: High
- Lead: GIS, Public Works Department
- Supporting: Wastewater/Environmental Department, Building/Zoning Department
- Time Frame: Short Term
- Cost Estimate: <$10,000

- Benefit: Reduces property damages and losses. Information to be used in updating the FEMA CRS program.

Action #6
Implement projected levels of sea level rise using the latest GIS software and online application in the planning review for, and development of, public and private projects.

- Priority Score: Low
- Lead: GIS, Planning Department, Building/Zoning Department
- Supporting: Planning Commission
- Time Frame: Medium Term
- Financing Options: Staff Time
- Cost Estimate: <$10,000
- Benefit: Prevents structural damage to residents and businesses.

Action #7
Upgrade existing GIS databases after natural disasters, where applicable.

- Priority Score: High
- Lead: GIS, CEMA
- Supporting: Planning Department, Building/Zoning Department
- Time Frame: Long Term
- Financing Options: Grants
- Cost Estimate: >$100,000
- Benefit: Protection of life and property. Better planning for future natural hazard events.

Action #8
Acquire more open space properties subject to natural hazards and land subject to flood or prone to flooding.

- Priority Score: Medium
- Lead: Town Council, Planning Commission, Conservation Commission
- Supporting: Planning Department, Administration, Land Trust
- Time Frame: Long Term
- Financing Options: Bonds, Grants, Federal and State Agencies
- Cost Estimate: >$100,000
- Benefit: Protects natural resources. Reduces property losses and improves resiliency in coastal zone.

Action #9
Promote the Fortified Program to storm proof historic archeological sites on the National Historic Registry.

- Priority Score: Medium
- Lead: Charlestown Historical Society
- Supporting: RI Historical Preservation & Heritage Commission, National Park Service
- Time Frame: Long Term
- Financing Options: Historical Society volunteers
- Cost Estimate: >$100,000
- Benefit: Provides a balance between historic preservation and mitigation.

Action #10
Complete the installation of hurricane shutter entry doors (Storm Guardian) on the Police Station and Emergency Operations Center (EOC).

- Priority Score: High
- Lead: CEMA
- Time Frame: Short Term
- Financing Options: Proposed FY17 CIP
- Cost Estimate: $10,000 - $50,000
- Benefit: Building resiliency into existing critical infrastructure. Minimize disruption to emergency services. Maintain municipal services. Protect power, communication lines, road and public safety.

Action #11
Purchase and install generators at Town Hall and animal shelter.

- Priority Score: Medium
- Lead: Charlestown Emergency Management Agency (CEMA)
- Time Frame: Short term
- Financing Options: Proposed FY17 CIP, RIEMA, FEMA
- Cost Estimate: >$100,000
- Benefit: Building resiliency into existing critical infrastructure. Minimize disruption to emergency services. Maintain municipal services. Protect power, communication lines, road and public safety.

Action #12
Upsize culverts on public transportation infrastructure, utilizing the Wood Pawcatuck Study to determine which culverts are in need.

- Priority Score: High
- Lead: Public Works Department
- Supporting: Finance, Administration

- Time Frame: Long Term
- Financing Options: Town Budget, RIEMA, FEMA
- Cost Estimate: >$100,000
- Benefit: Protect life and property. Reduce areas subject to flooding. Reduce cost of repair to transportation infrastructure.

Action #13
Upgrade the bridge and elevate the roadway to prevent washout on Kings Factory Road where it crosses Straight Brook.

- Priority Score: Low
- Lead: Public Works Department
- Supporting: Finance, Administration
- Time Frame: Long Term
- Financing Options: Town Budget
- Cost Estimate: >$100,000
- Benefit: Protect life and property. Reduce areas subject to flooding. Reduce cost of repair to transportation infrastructure

Action #14
Remove the outdated stormwater discharge system on Charlestown Beach Road and replace it with a low impact design (LID) best management practice (BMP) stormwater management system.

- Priority Score: High
- Lead: Department of Public Works
- Supporting: Finance, Administration
- Time Frame: Short Term
- Financing Options: CIP FY17 and State Grants
- Cost Estimate: >$100,000
- Benefit: Protection of life and property. Reduce areas subject to flooding. Improve water quality.

Action #15
Incorporate the Association of State Floodplain Managers (ASFPM) "No Adverse Impact Floodplain Management" policy into local floodplain management programs and municipal plans.

- Priority Score: Medium
- Lead: Building/Zoning Department (Floodplain Manager)
- Supporting: Planning Department
- Time Frame: Medium Term
- Financing Options: Staff Time

- Cost Estimate: <$10,000
- Benefit: Supports comprehensive mitigation actions to reduce risks and vulnerabilities that affect Charlestown.

Action #16
Encourage elevation through grants for damaged, repetitive loss properties.

- Priority Score: Low
- Lead: Building/Zoning Department
- Supporting: Planning Commission, RIEMA, FEMA
- Time Frame: Short Term
- Financing Options: Grants
- Cost Estimate: >$100,000
- Benefit: Prevents future flood damage to Repetitive Loss properties and removal from the Repetitive Loss list.

Action #17
Mitigate storm damaged dunes with overwash materials, and as an alternative, implement non-structural alternatives to shoreline protection through the beneficial reuse of dredged materials, per approval of the CRMC.

- Priority Score: Medium
- Lead: Public Works Department, Building/Zoning Department, GIS
- Supporting: Administration, Town Council
- Time Frame: Short Term
- Financing Options: Grants
- Cost Estimate: $50,000 - $100,000
- Benefit: Prevents structural damage to coastal properties.

Action #18
Implement dredging of breachway and deltas in the salt ponds to maintain and improve flow and enhance circulation. Inspection, after a natural disaster, of coastal structures and existing jetties to ensure structural stability.

- Priority Score: Medium
- Lead: Harbor Master, GIS
- Supporting: Administration, Coastal Ponds Commission, RIDEM, CRMC
- Time Frame: Medium Term
- Financing Options: Grants
- Cost Estimate: >$100,000
- Benefit: Ensure the storm surge mitigation effects of the salt ponds.

Table 28 2010/2016 Charlestown Natural Hazard Mitigation Actions Update

2010/2016 Charlestown Natural Hazard Mitigation Plan Action Item Status Report		
2010 Action Item	**Objective/Benefit**	**2016 Status of 2010 Proposed Mitigation Actions**
1	**Incorporate Hazard Mitigation into Project Review**	
	Create Charlestown GIS Database	Added to Capabilities Section "completed GIS locations of hazard prone structures and risk areas to be utilized during development reviews in the comprehensive plan". Modified and added new (2016) Action #7: The GIS Department would like the ability to upgrade, add and/or enhance current existing GIS databases after a natural disasters with future mitigation funding, where applicable.
2	**Develop & Implement Public Education & Outreach**	
	a) Pre- & Post Financial Incentives for mitigation	Implemented and will continue. Added to Capabilities Section "The Floodplain Manager/CRS coordinator continues to investigate pre- and post-financial incentives for mitigation, distribute information on the location of hazard-prone areas, support public & private financial partnerships, continue to sustain and upgrade ISDS systems in flood zones, local boards and officials continue to participate in natural hazards and hazard mitigation trainings, and sustain a complied list of homeowners in self-inspection of their property.
	b) Distribute information on location of hazard-prone areas	
	c) Support Public/Private Partnerships to create financial incentives	
	d) Provide information on ISDS Upgrade Options	
	e) Provide Training Programs for natural hazard mitigation	
	f) Develop a list of appropriate techniques for homeowners	

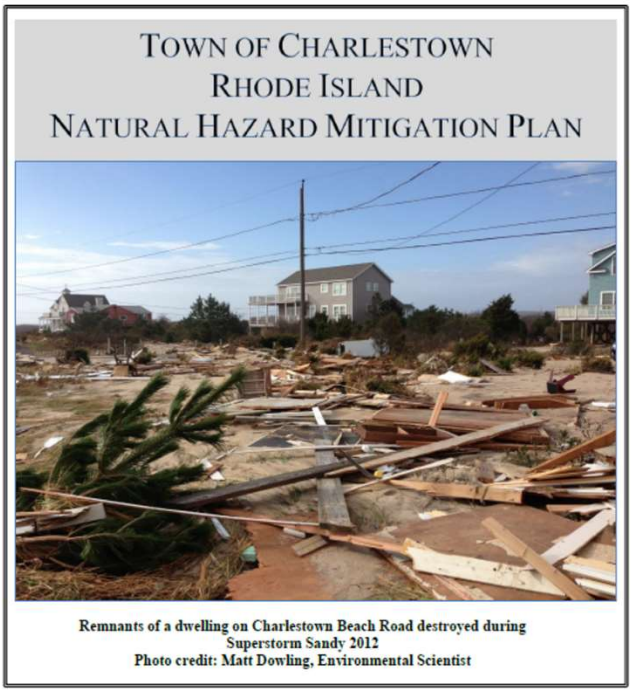
2010 Action Item	Objective/Benefit	2016 Status of 2010 Proposed Mitigation Actions
3	**Determine Post-Disaster Mitigation Opportunities**	
	a) See Action 5	The Building Official continues to implement these actions. Added to Capabilities Section.
	b) Implement structural & non-structural retrofit programs	
	c) Document areas of destruction & risk post-disaster	
4	**Develop a shoreline overlay**	
	a) Develop a hazard zoning overlay	Completed.
5	**Acquire Land in Hazard-Prone Regions**	
	a) Establish a revenue source to purchase hazard-prone property	Combined and Modified into (2016) Action #8.
	b) Acquire vulnerable properties subject to natural hazard risk	
	c) Identify opportunities for post-disaster open space acquisition in a pre-disaster time frame	
6	**Floodplain Management Program**	
	Establish a FMP; participant in CRS	Completed. Added to Capabilities Section.
6 [sic]	**Incorporate Hazard Mitigation into Project Review**	
	Strictly enforce floodplain standards for structures in V and A zones	Building Official continues to enforce. Added to Capabilities Section.
7	**Provide Public Education Materials**	
	Landscaping to reduce erosion and damage from wind	Completed. Added to Capabilities Section.
	Evacuation maps and signs posted along state roads	Completed. Added to Capabilities Section.
	Building Inspector discusses current regulations and standards on building, renovation and floodplain management	Completed. Added to Capabilities Section.

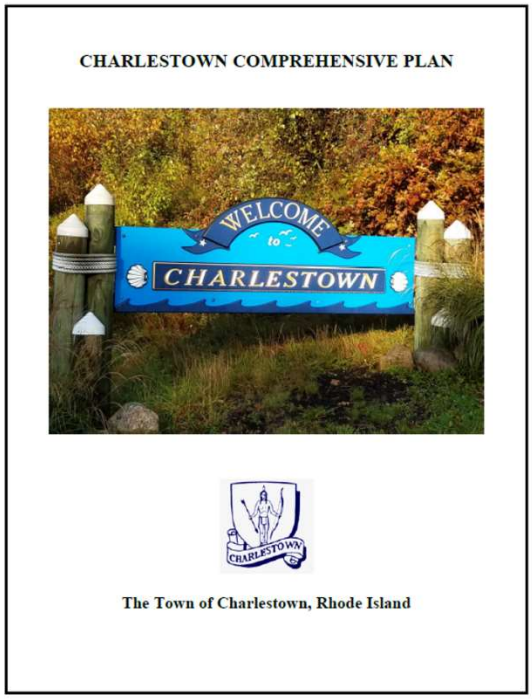
2010 Action Item	Objective/Benefit	2016 Status of 2010 Proposed Mitigation Actions
8	**Identify Post-Disaster Mitigation Opportunities**	
	Property Acquisition	Modified into (2016) Action #8
	Encourage Retrofit of damage property (repetitive loss properties)	Modified into (2016) Action #17
	Implement non-structural alternatives to shoreline protection (nourishment or dune planting)	Modified into (2016) Action #18
	Build the barrier using sand overwash	Modified into (2016) Action #14
9	**Enhance Public Beach Facilities and Public Access**	
	Develop dune/beach nourishment program for barrier beaches	Modified into (2016) Action #18
	Upgrade public beach facilities	Completed. Added to Capabilities Section.
10	**Enhance Disaster Preparedness**	
	Develop post-storm recovery plan	Completed Established Rapid Assessment Building Team Added to Capabilities Section.
	Formalize Mutual Aid with neighboring towns for post disaster inspections	Completed. Added to Capabilities Section.
	Maintain a disaster recovery team	Completed. Added to Capabilities Section.
11	**Enhance Circulation in Coastal Ponds**	Combined (2010) Action 11 and (2010) Action 12 into new (2016) Action #19
	Evaluate options to improve flow and examine the existing structural integrity of existing jetties	
12	**Improve navigation facilities**	
	Charlestown Breachway	
	Inspect Shoreline Structures to ensure structural stability	

2010 Action Item	Objective/Benefit	2016 Status of 2010 Proposed Mitigation Actions
13	**Incorporate Hazard Mitigation into Project Review**	
	Incorporate BMPs into Public Works improvement projects	Completed. Added to Capabilities Section.
14	**Develop and Implement Public Education and Outreach**	
	Evacuation Routes	Completed.
15	**Determine Post-Disaster Mitigation Opportunities**	
	Document problems with disasters for future mitigation activities	Completed.
	Evaluate the appropriateness of replacing under-sized culverts with adequate culverts	Modified to new (2016) Action #12 (Wood Pawcatuck Study)
	Reevaluate Evacuation Plan	Completed.
	Incorporate adequate drainage facilities for road repair	Modified to new (2016) Action #13
16	**Project Development/Capital Facilities Budget**	
	Incorporate mitigation infrastructure improvements (new subdivisions, repaving of roads) into ongoing and new public works projects	Modified to new (2016) Action #13
17	**Incorporate Hazard Mitigation into Land Development Review**	
	Develop standardized policies for risk area	Completed.
	Maintain adequate fire breaks and access to and within forested area	Modified and added to Capabilities.
	Subdivision and land development plans to include granting of easement for fire breaks and installation of concrete water tanks	Modified and added to Planning Recommendations.
18	**Develop and Implement Public Education and Outreach**	
	Educate public about safe fire practices	Completed (function of fire department).
19	**Improve Fire Fighting Capability**	Completed (function of fire department).

Appendix B

Charlestown
Map Resource Packet*
Used During
Workshop





***Gathered from Charlestown's Local HMP (2016) & Comprehensive Plan (2021)**

Figure 6. FEMA Special Flood Hazard Area (SFHA) zones within RI – Source RI Hazard Mitigation Plan

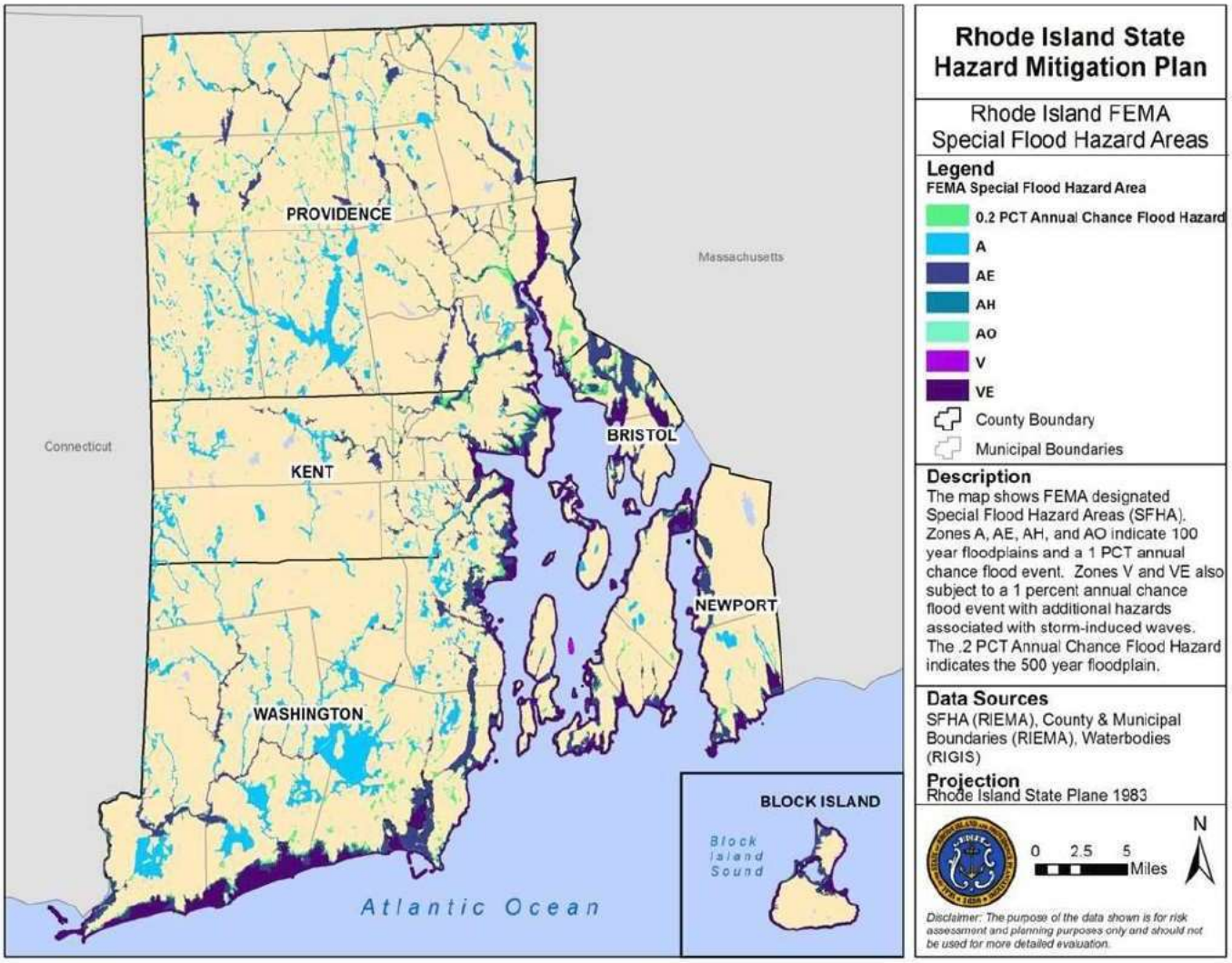
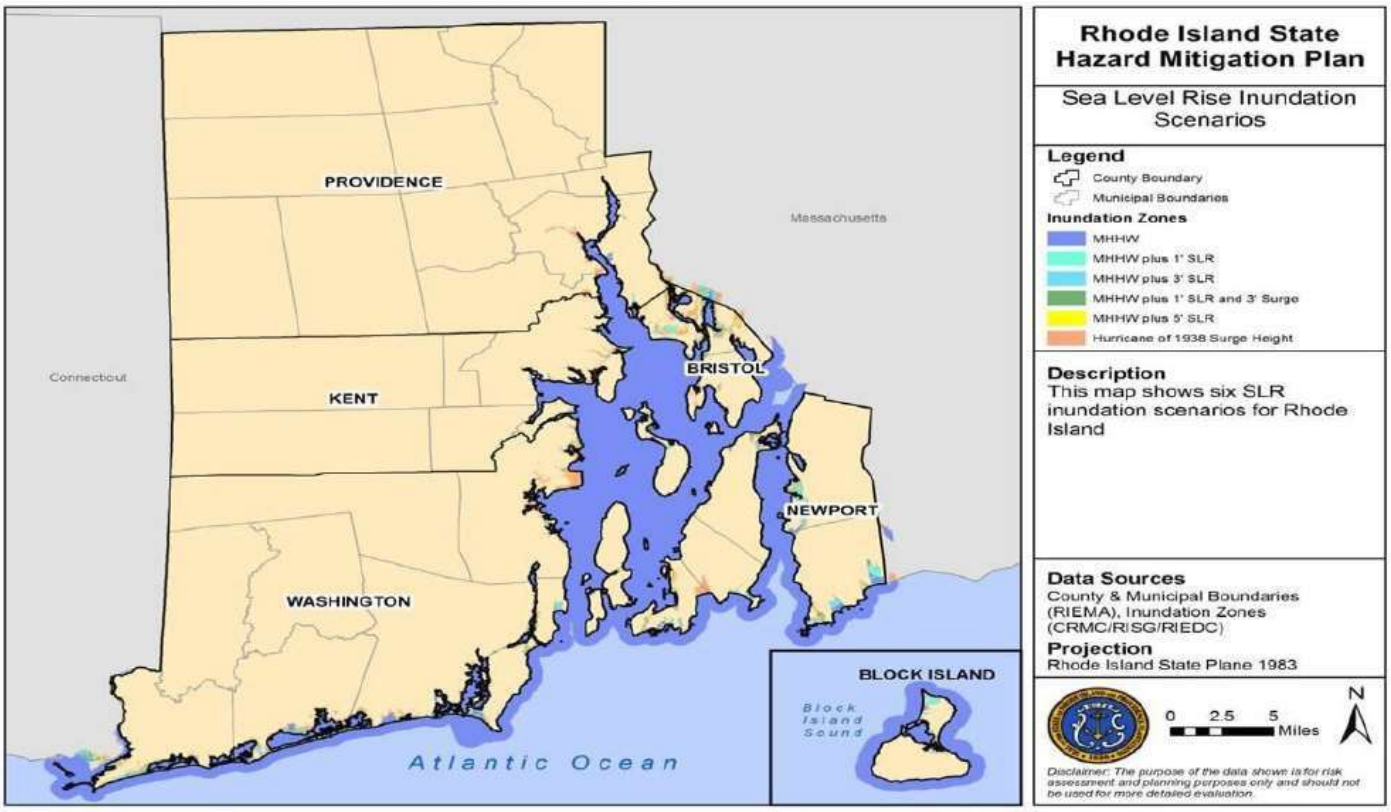
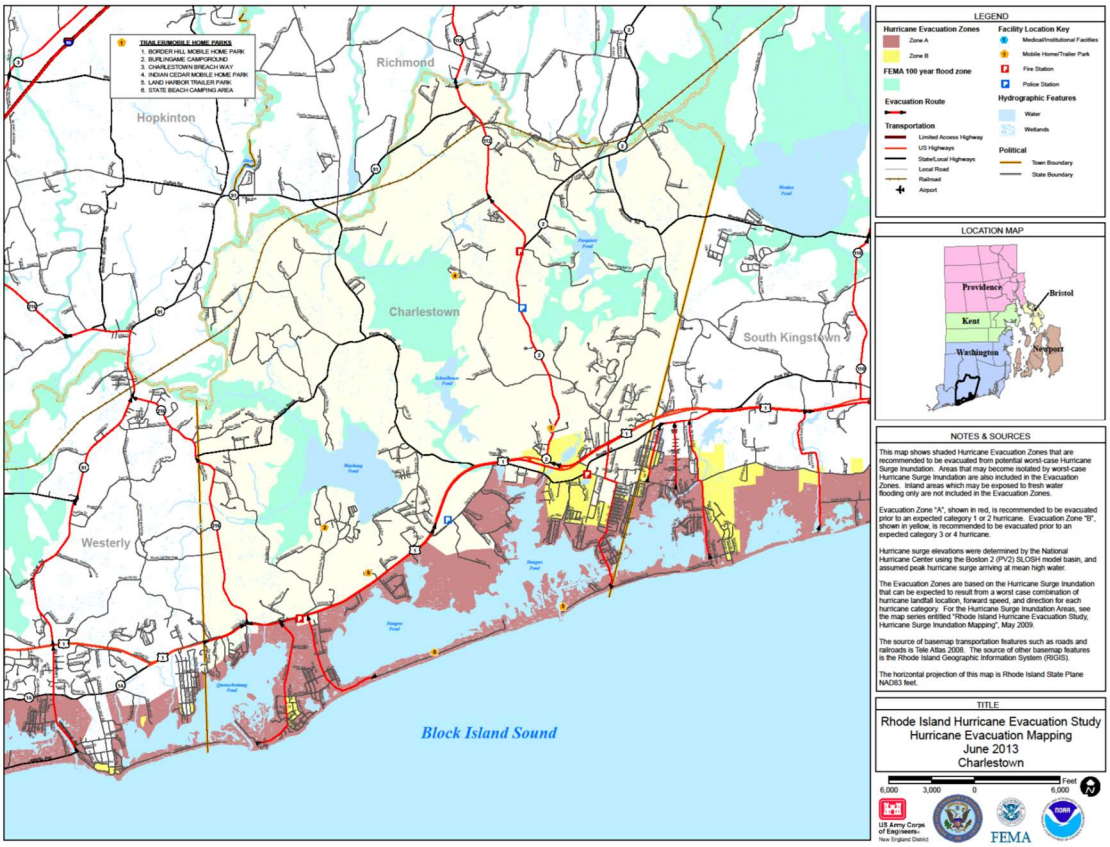
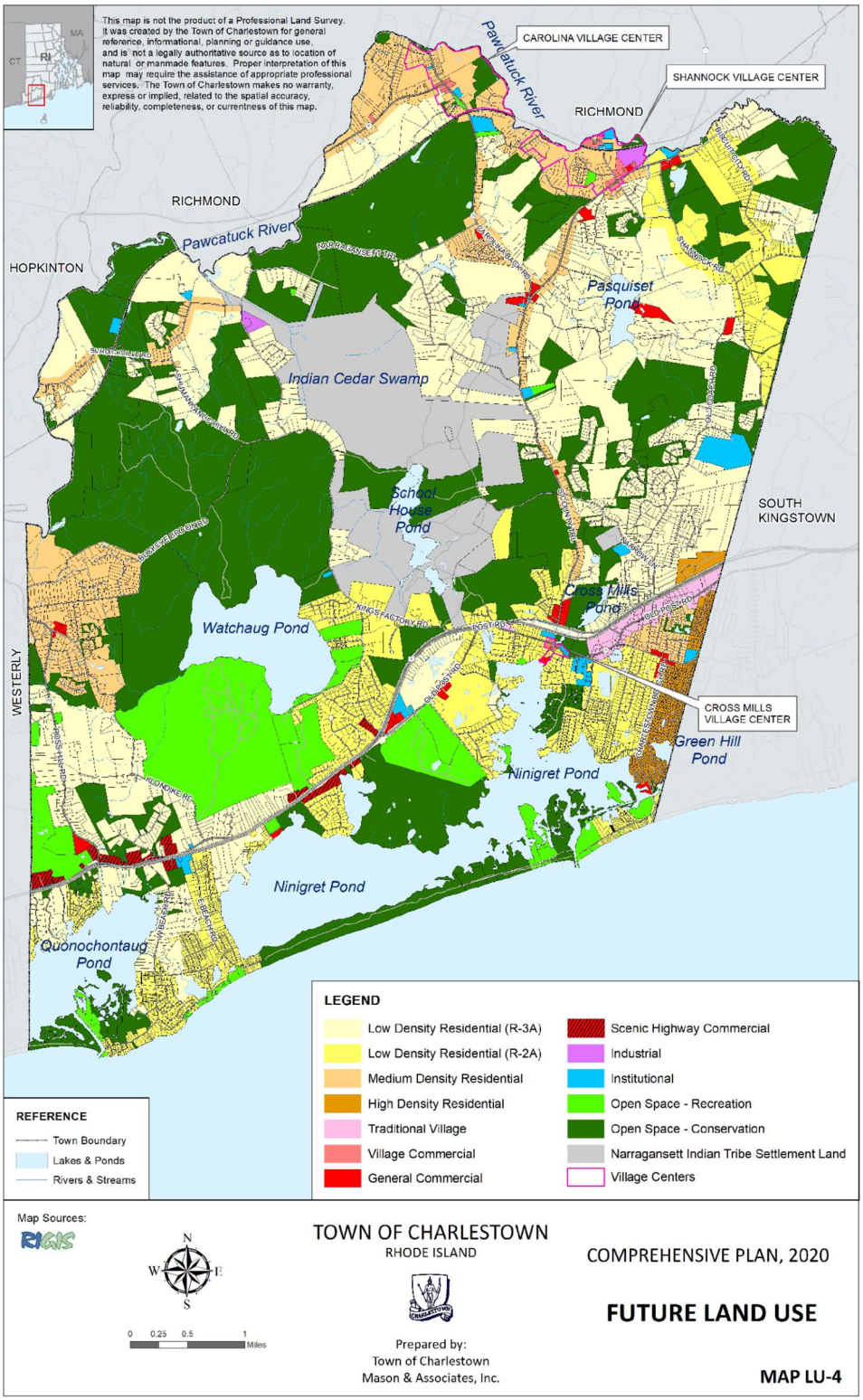


Figure 7 – Sea Level Rise Inundation Scenarios.




TRAILER/MOBILE HOME PARKS
1. BORDER HILL MOBILE HOME PARK
2. BURLINGAME CAMPGROUND
3. CHARLESTOWN BREACH WAY
4. INDIAN CEDAR MOBILE HOME PARK
5. LAND HARBOR TRAILER PARK
6. STATE BEACH CAMPING AREA
Hopkinton
Richmond
Charlestown
South Kingstown
Westerly
Block Island Sound
LEGEND
Hurricane Evacuation Zones
Zone A
Zone B
FEMA 100 year flood zone
Evacuation Route
Transportation
Limited Access Highway
US Highways
State/Local Highways
Local Road
Railroad
Airport
Facility Location Key
Medical/Institutional Facilities
Mobile Home/Trailer Park
Fire Station
Police Station
Hydrographic Features
Water
Wetlands
Political
Town Boundary
State Boundary
LOCATION MAP
Providence
Bristol
Kent
Washington
Newport
NOTES & SOURCES
This map shows shaded Hurricane Evacuation Zones that are recommended to be evacuated from potential worst-case Hurricane Surge Inundation. Areas that may become isolated by worst-case Hurricane Surge Inundation are also included in the Evacuation Zones. Inland areas which may be exposed to fresh water flooding only are not included in the Evacuation Zones.
Evacuation Zone "A", shown in red, is recommended to be evacuated prior to an expected category 1 or 2 hurricane. Evacuation Zone "B", shown in yellow, is recommended to be evacuated prior to an expected category 3 or 4 hurricane.
Hurricane surge elevations were determined by the National Hurricane Center using the Boston 2 (P/V2) SLOSH model basin, and assumed peak hurricane surge arriving at mean high water.
The Evacuation Zones are based on the Hurricane Surge Inundation that can be expected to result from a worst case combination of hurricane landfall location, forward speed, and direction for each hurricane category. For the Hurricane Surge Inundation Areas, see the map series entitled "Rhode Island Hurricane Evacuation Study, Hurricane Surge Inundation Mapping", May 2009.
The source of basemap transportation features such as roads and railroads is Tele Atlas 2008. The source of other basemap features is the Rhode Island Geographic Information System (RIGIS).
The horizontal projection of this map is Rhode Island State Plane NAD83 feet.
TITLE
Rhode Island Hurricane Evacuation Study
Hurricane Evacuation Mapping
June 2013
Charlestown
Feet
6,000
3,000
0
6,000
US Army Corps of Engineers
New England District
FEMA


Map Locus
MA
CT
RI
This map is not the product of a Professional Land Survey. It was created by the Town of Charlestown for general reference, informational, planning or guidance use, and is not a legally authoritative source as to location of natural or manmade features. Proper interpretation of this map may require the assistance of appropriate professional services. The Town of Charlestown makes no warranty, express or implied, related to the spatial accuracy, reliability, completeness, or currentness of this map.
Map Sources:
RIGIS
N
W
E
S
0 0.25 0.5 1 Miles
0 0.5 1 Kilometers
TOWN OF CHARLESTOWN
RHODE ISLAND
Prepared by:
Town of Charlestown
Mason & Associates, Inc.
COMPREHENSIVE PLAN, 2020
AERIAL PHOTOGRAPH 2019
MAP LU-1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CAROLINA VILLAGE CENTER
SHANNOCK VILLAGE CENTER
RICHMOND
Pawcatuck River
HOPKINTON
Pasquiset Pond
Indian Cedar Swamp
School House Pond
SOUTH KINGSTOWN
Cross Mills Pond
Watchaug Pond
WESTERLY
CROSS MILLS VILLAGE CENTER
Green Hill Pond
Ninigret Pond
Quonochontaug Pond
LEGEND
Low Density Residential (R-3A)
Low Density Residential (R-2A)
Medium Density Residential
High Density Residential
Traditional Village
Village Commercial
General Commercial
Scenic Highway Commercial
Industrial
Institutional
Open Space - Recreation
Open Space - Conservation
Narragansett Indian Tribe Settlement Land
Village Centers
REFERENCE
Town Boundary
Lakes & Ponds
Rivers & Streams
Map Sources:
RIGIS
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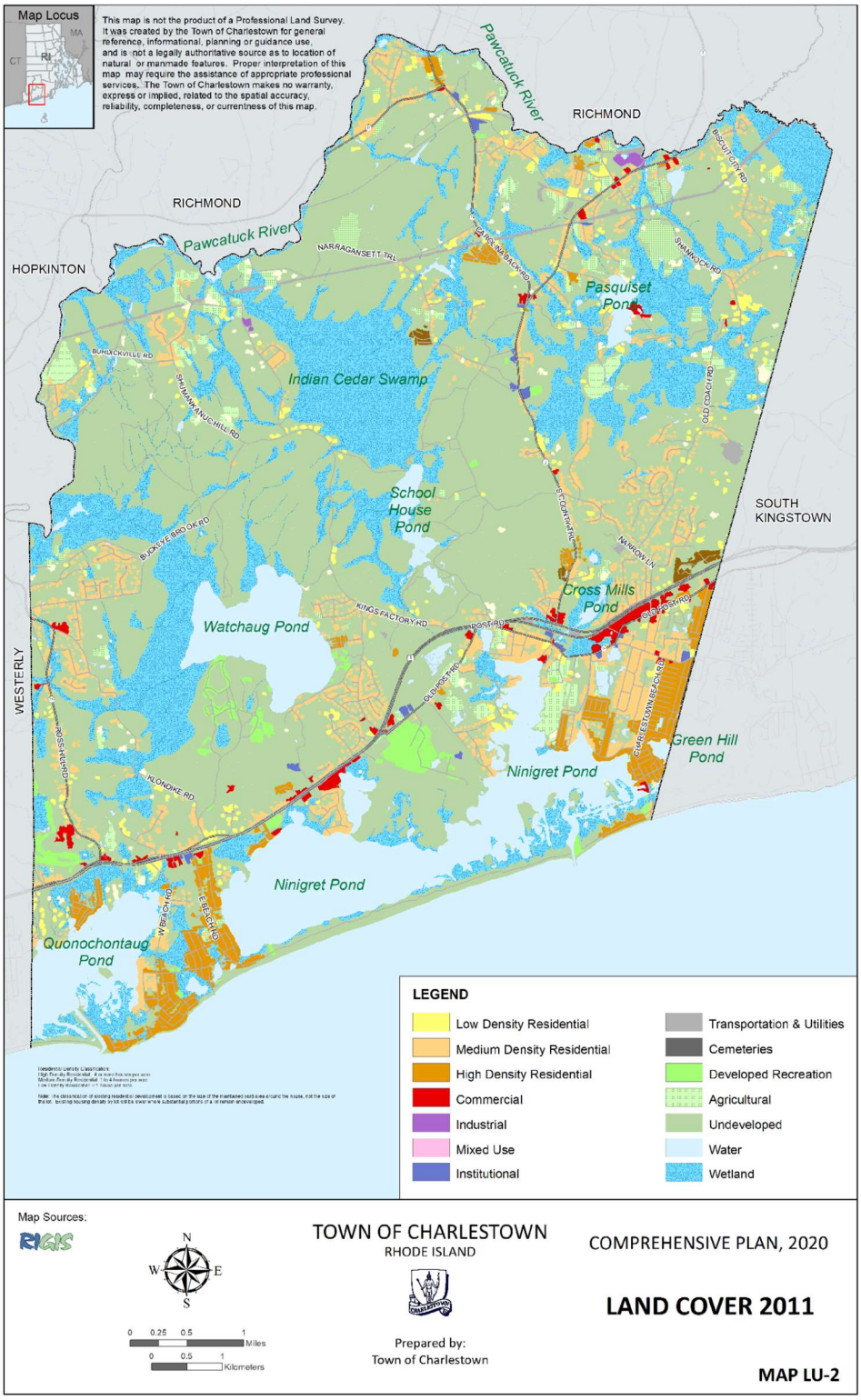
0 0.25 0.5 1 Miles
TOWN OF CHARLESTOWN
RHODE ISLAND
COMPREHENSIVE PLAN, 2020
FUTURE LAND USE
Prepared by:
Town of Charlestown
Mason & Associates, Inc.
MAP LU-4


Map Locus
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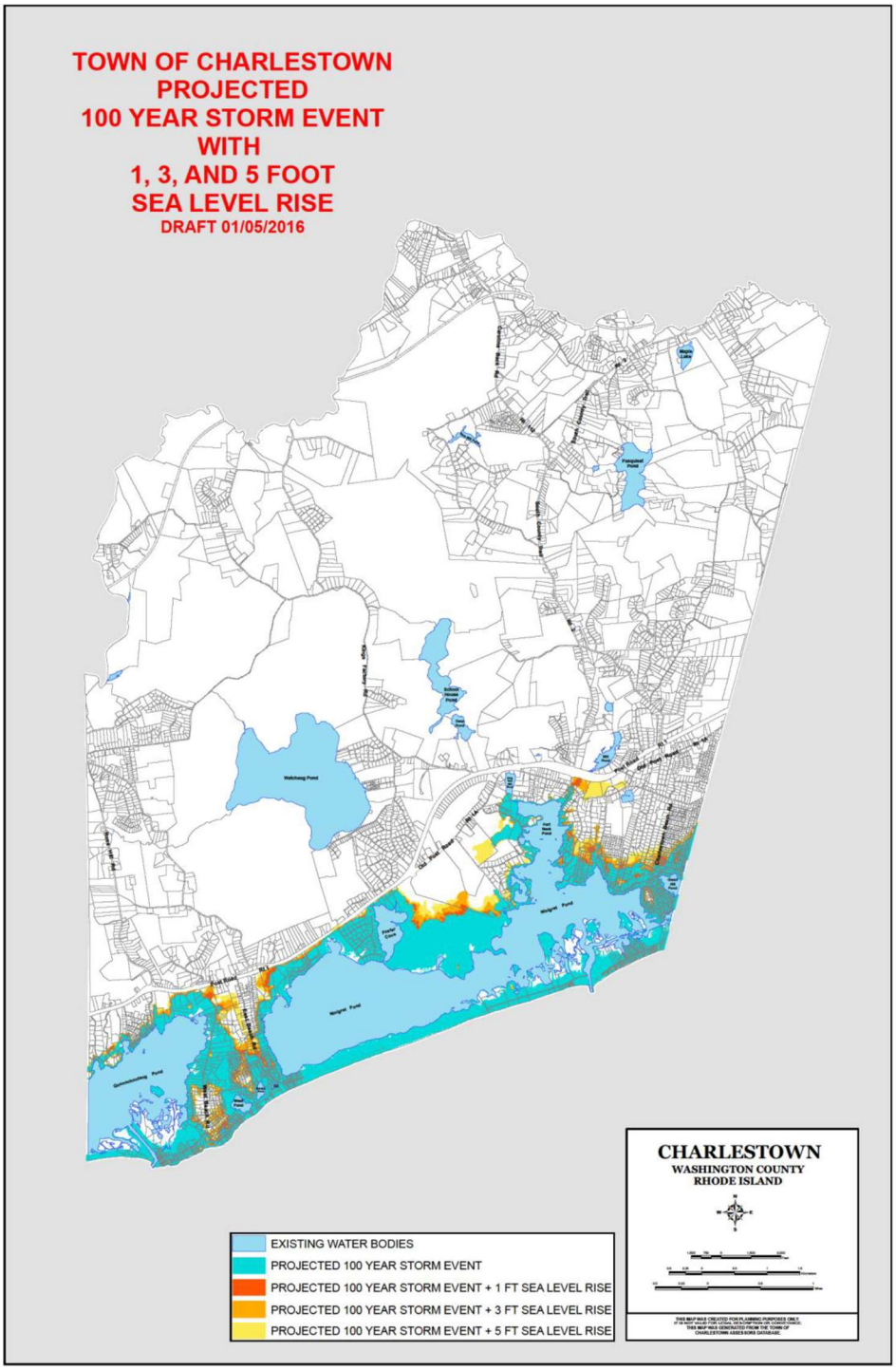
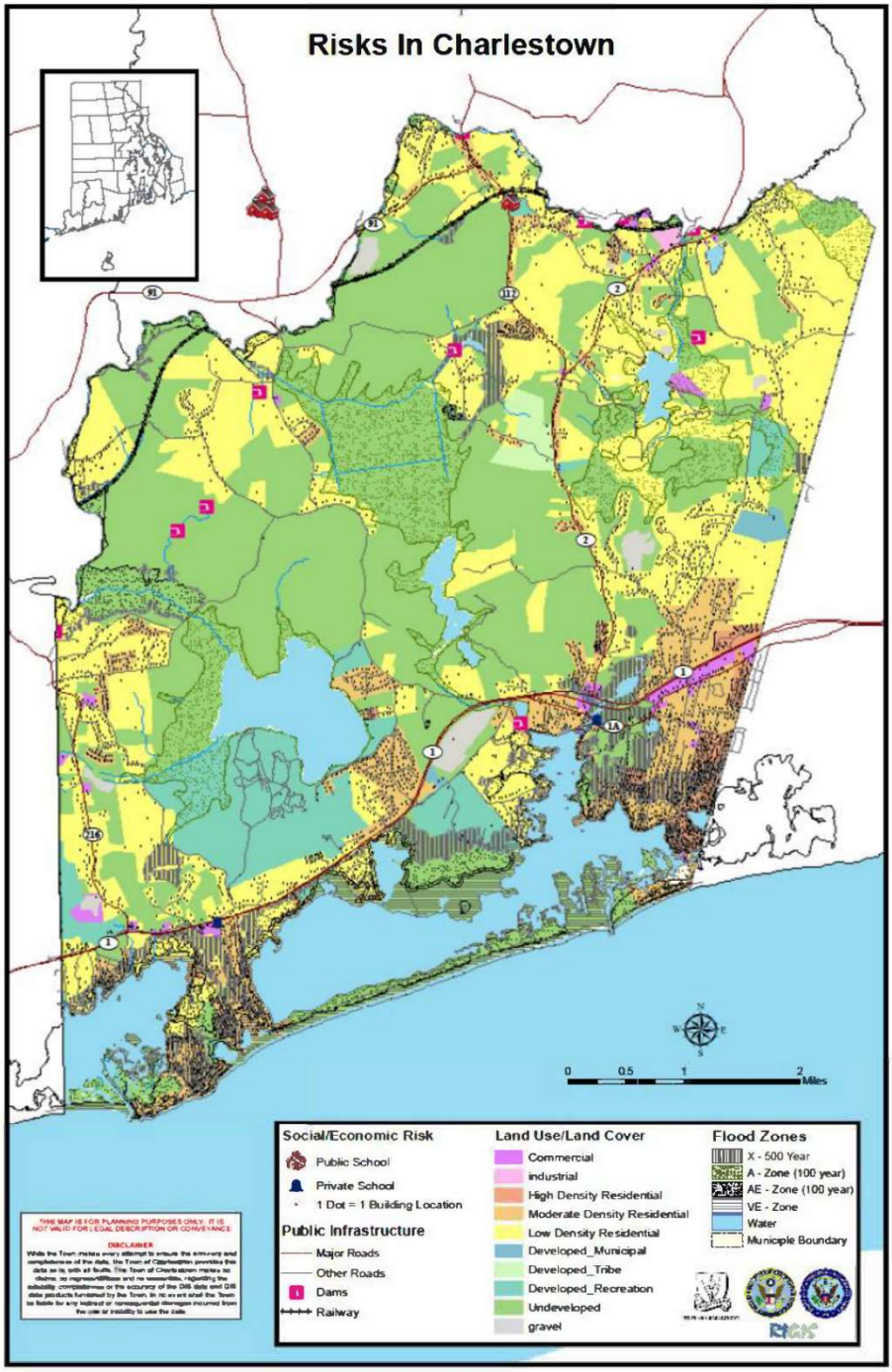
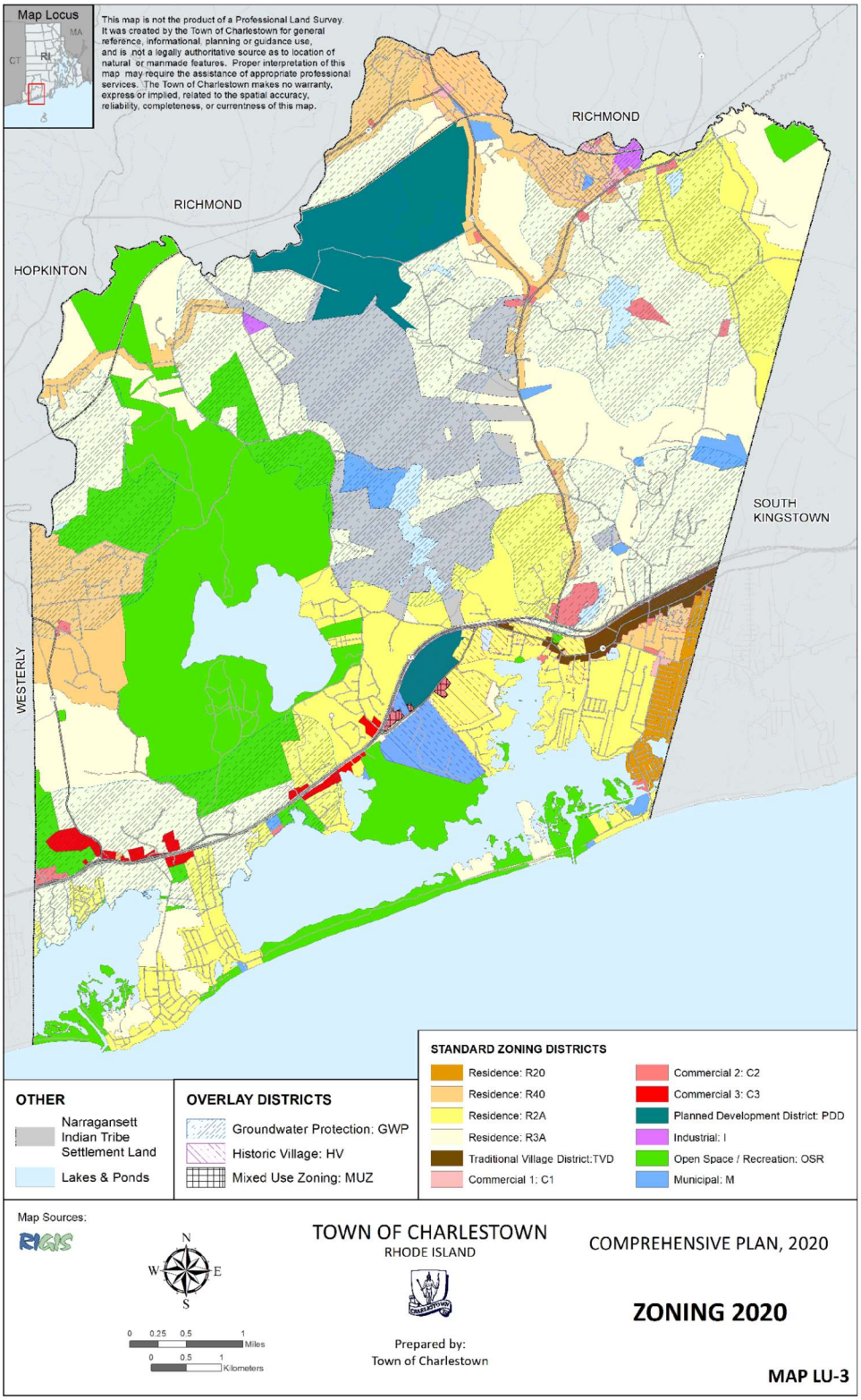
Pawcatuck River
RICHMOND
HOPKINTON
WESTERLY
SOUTH KINGSTOWN
Pasquiset Pond
Indian Cedar Swamp
School House Pond
Watchaug Pond
Cross Mills Pond
Green Hill Pond
Ninigret Pond
Quonochontaug Pond
NARRAGANSETT TRL
BUCKEYE BROOK RD
KINGS FACTORY RD
POST RD
OLD POST RD
OLD COACH RD
SWANNOCK RD
BURDICKVILLE RD
SHUMANKANUCK HILL RD
KLONDIKE RD
ROSS HILL RD
OLD DIKE RD
CHARLESTOWN BEACH RD
W BEACH RD
E BEACH RD
NARROW LN
LEGEND
Low Density Residential
Medium Density Residential
High Density Residential
Commercial
Industrial
Mixed Use
Institutional
Transportation & Utilities
Cemeteries
Developed Recreation
Agricultural
Undeveloped
Water
Wetland
Map Sources:
RIGIS
N
W
E
S
0 0.25 0.5 1 Miles
0 0.5 1 Kilometers
TOWN OF CHARLESTOWN
RHODE ISLAND
Prepared by:
Town of Charlestown
COMPREHENSIVE PLAN, 2020
LAND COVER 2011
MAP LU-2


TOWN OF CHARLESTOWN
PROJECTED
100 YEAR STORM EVENT
WITH
1, 3, AND 5 FOOT
SEA LEVEL RISE
DRAFT 01/05/2016
EXISTING WATER BODIES
PROJECTED 100 YEAR STORM EVENT
PROJECTED 100 YEAR STORM EVENT + 1 FT SEA LEVEL RISE
PROJECTED 100 YEAR STORM EVENT + 3 FT SEA LEVEL RISE
PROJECTED 100 YEAR STORM EVENT + 5 FT SEA LEVEL RISE
CHARLESTOWN
WASHINGTON COUNTY
RHODE ISLAND


Risks In Charlestown
0 0.5 1 2 Miles
Social/Economic Risk
Public School
Private School
1 Dot = 1 Building Location
Public Infrastructure
Major Roads
Other Roads
Dams
Railway
Land Use/Land Cover
Commercial
industrial
High Density Residential
Moderate Density Residential
Low Density Residential
Developed_Municipal
Developed_Tribe
Developed_Recreation
Undeveloped
gravel
Flood Zones
X - 500 Year
A - Zone (100 year)
AE - Zone (100 year)
VE - Zone
Water
Municiple Boundary
THIS MAP IS FOR PLANNING PURPOSES ONLY. IT IS NOT VALID FOR LEGAL DESCRIPTION OR CONVEYANCE
DISCLAIMER


Map Locus
MA
CT
RI
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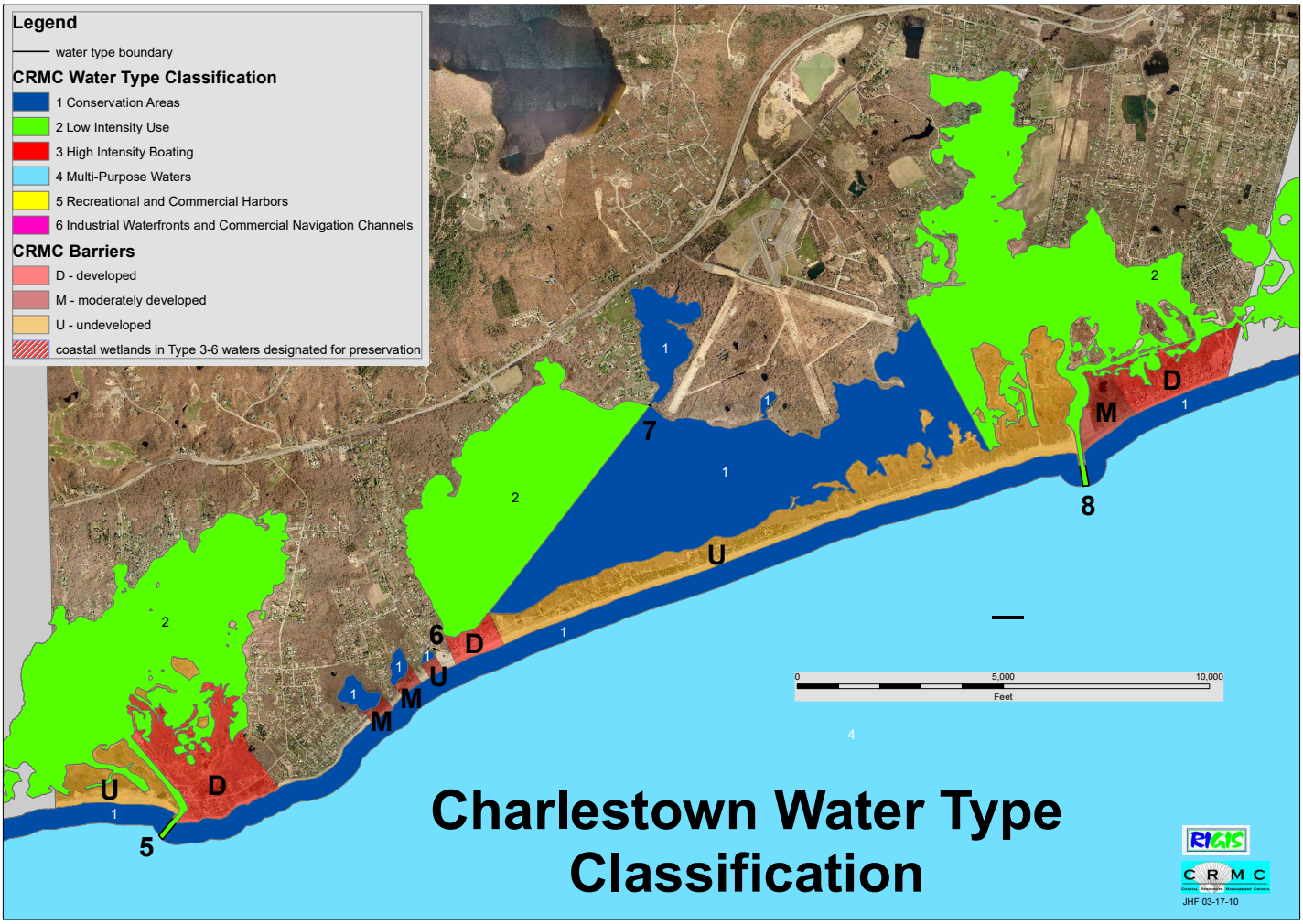
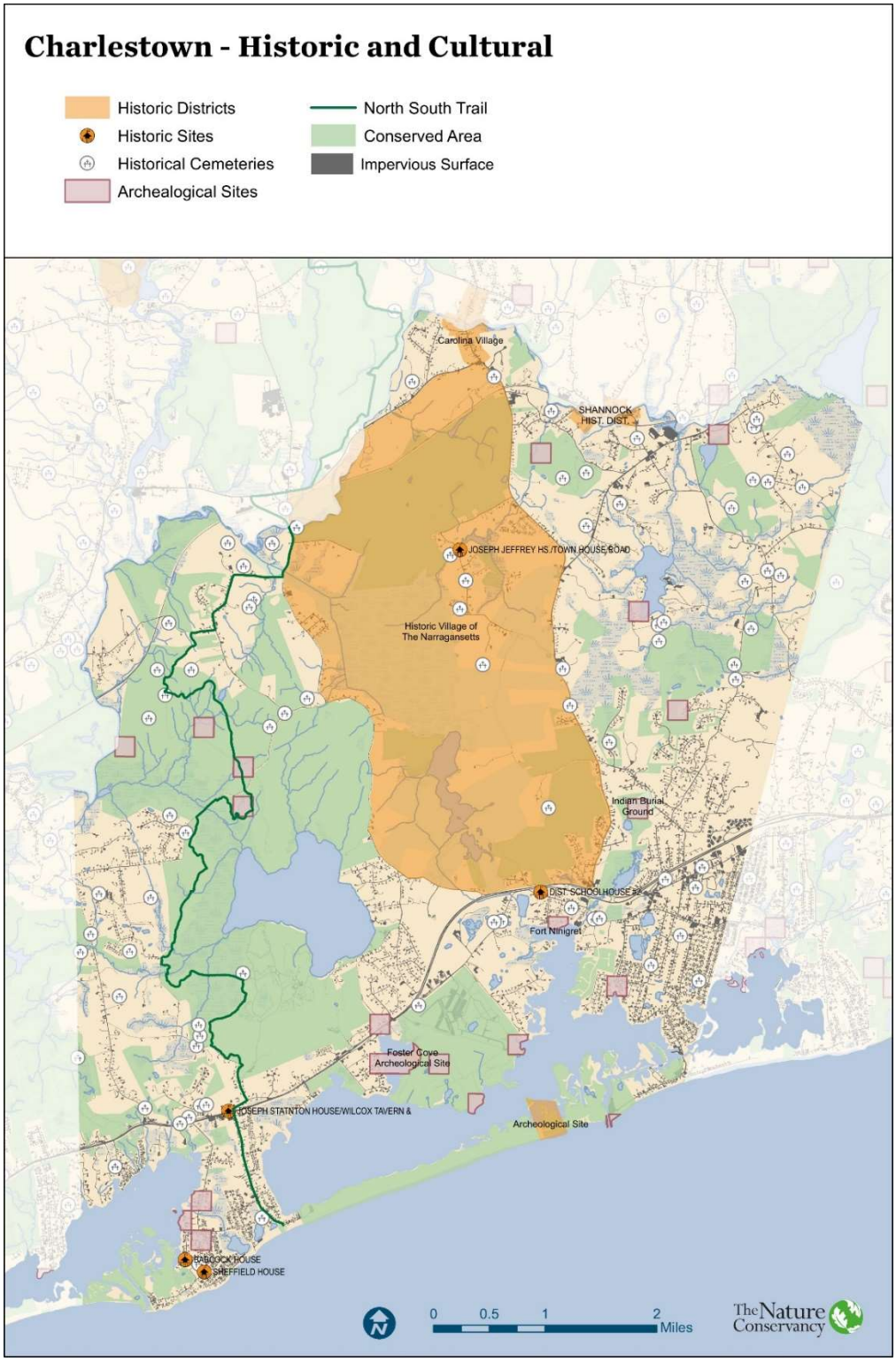
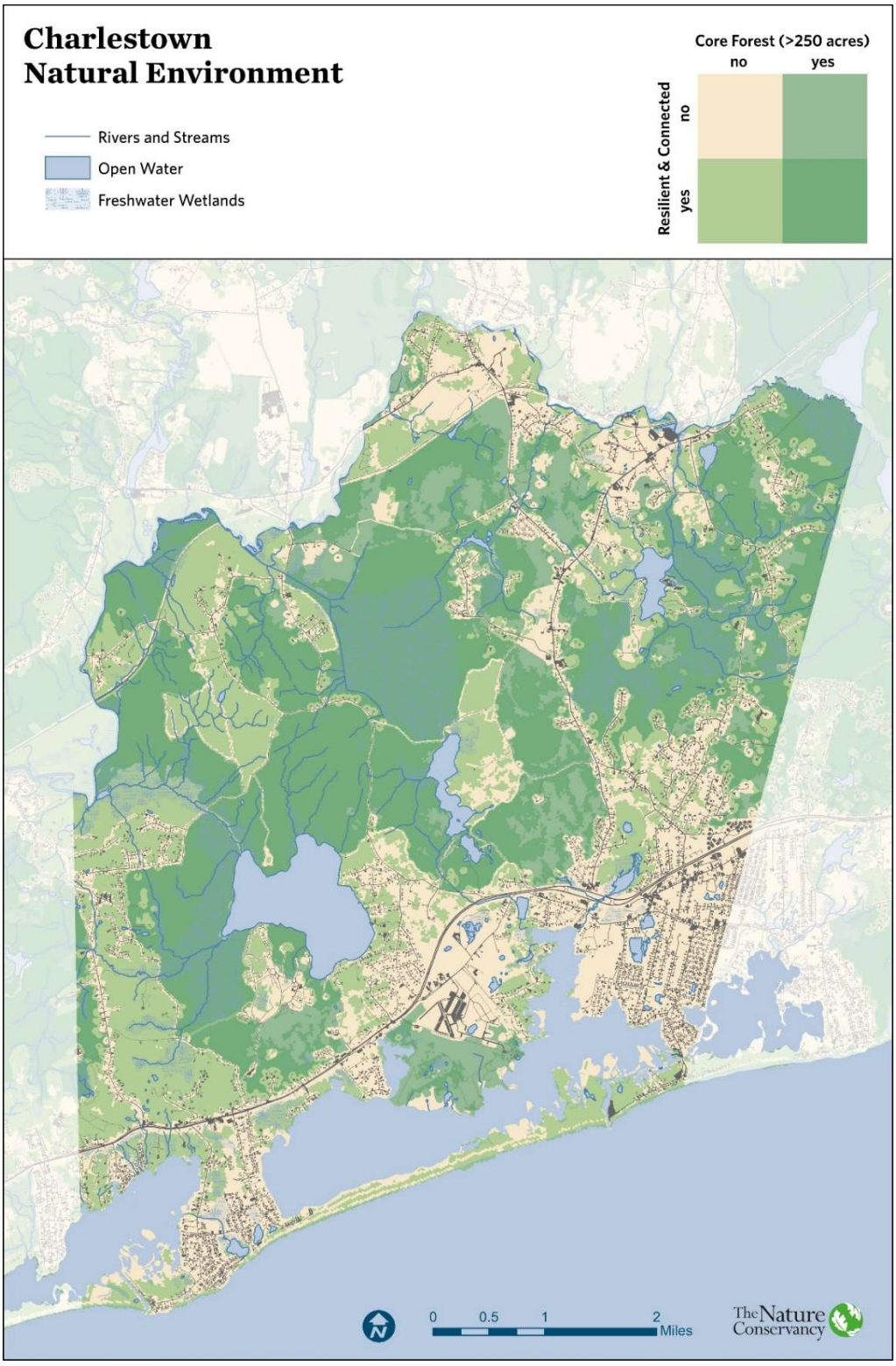
RICHMOND
RICHMOND
HOPKINTON
SOUTH KINGSTOWN
WESTERLY
STANDARD ZONING DISTRICTS
Residence: R20
Residence: R40
Residence: R2A
Residence: R3A
Traditional Village District:TVD
Commercial 1: C1
Commercial 2: C2
Commercial 3: C3
Planned Development District: PDD
Industrial: I
Open Space / Recreation: OSR
Municipal: M
OTHER
Narragansett Indian Tribe Settlement Land
Lakes & Ponds
OVERLAY DISTRICTS
Groundwater Protection: GWP
Historic Village: HV
Mixed Use Zoning: MUZ
Map Sources:
RIGIS
N
W
E
S
0 0.25 0.5 1 Miles
0 0.5 1 Kilometers
TOWN OF CHARLESTOWN
RHODE ISLAND
Prepared by:
Town of Charlestown
COMPREHENSIVE PLAN, 2020
ZONING 2020
MAP LU-3


Legend
water type boundary
CRMC Water Type Classification
1 Conservation Areas
2 Low Intensity Use
3 High Intensity Boating
4 Multi-Purpose Waters
5 Recreational and Commercial Harbors
6 Industrial Waterfronts and Commercial Navigation Channels
CRMC Barriers
D - developed
M - moderately developed
U - undeveloped
coastal wetlands in Type 3-6 waters designated for preservation
0
5,000
10,000
Feet
Charlestown Water Type Classification
JHF 03-17-10

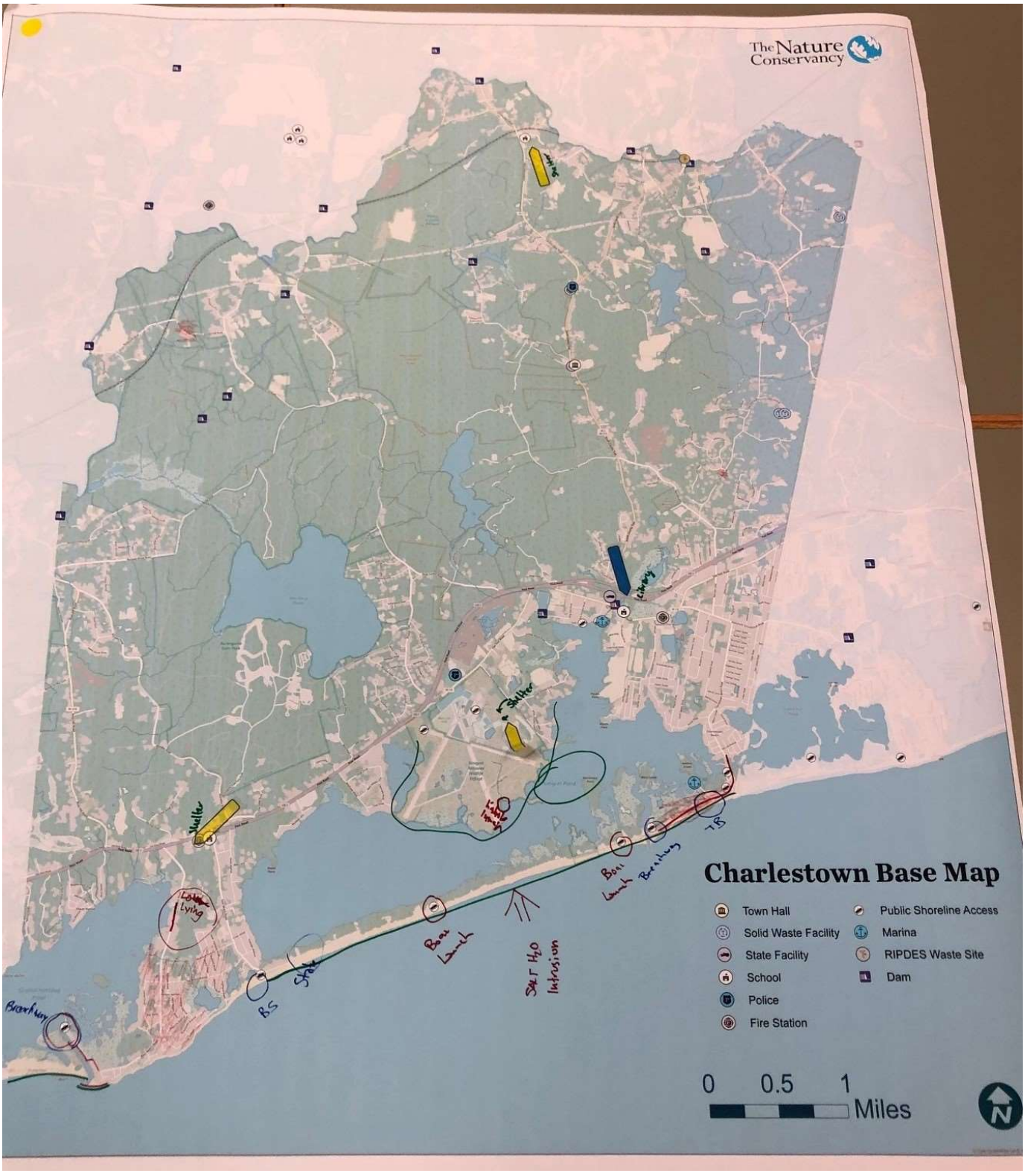

Charlestown - Historic and Cultural
Historic Districts
Historic Sites
Historical Cemeteries
Archealogical Sites
North South Trail
Conserved Area
Impervious Surface
Carolina Village
SHANNOCK HIST. DIST.
JOSEPH JEFFREY HS./TOWN HOUSE/GOAD
Historic Village of The Narragansetts
Indian Burial Ground
DIST. SCHOOLHOUSE #2
Fort Ninigret
Foster Cove Archeological Site
JOSEPH STANTON HOUSE/WILCOX TAVERN &
Archeological Site
BABCOCK HOUSE
SHEFFIELD HOUSE
0 0.5 1 2 Miles
The Nature Conservancy


Charlestown
Natural Environment
Rivers and Streams
Open Water
Freshwater Wetlands
Core Forest (>250 acres)
no
yes
Resilient & Connected
no
yes
0
0.5
1
2
Miles
The Nature Conservancy

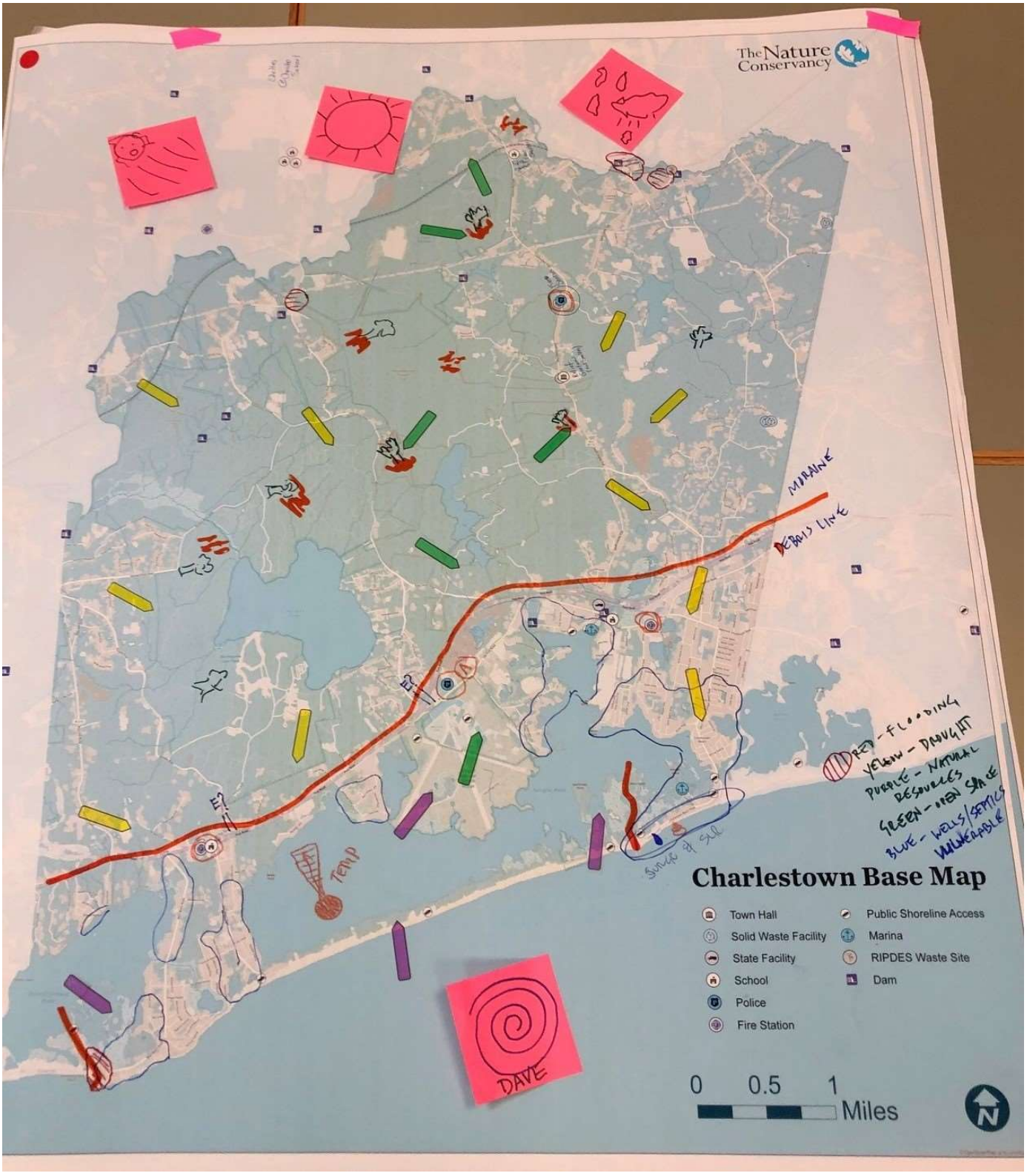
Appendix C

Charlestown
Base Maps
Generated During the
Community Resilience Building Workshop
by
Participants

Green Group Charlestown Base Map



Yellow Group Charlestown Base Map



Red Group Charlestown Base Map

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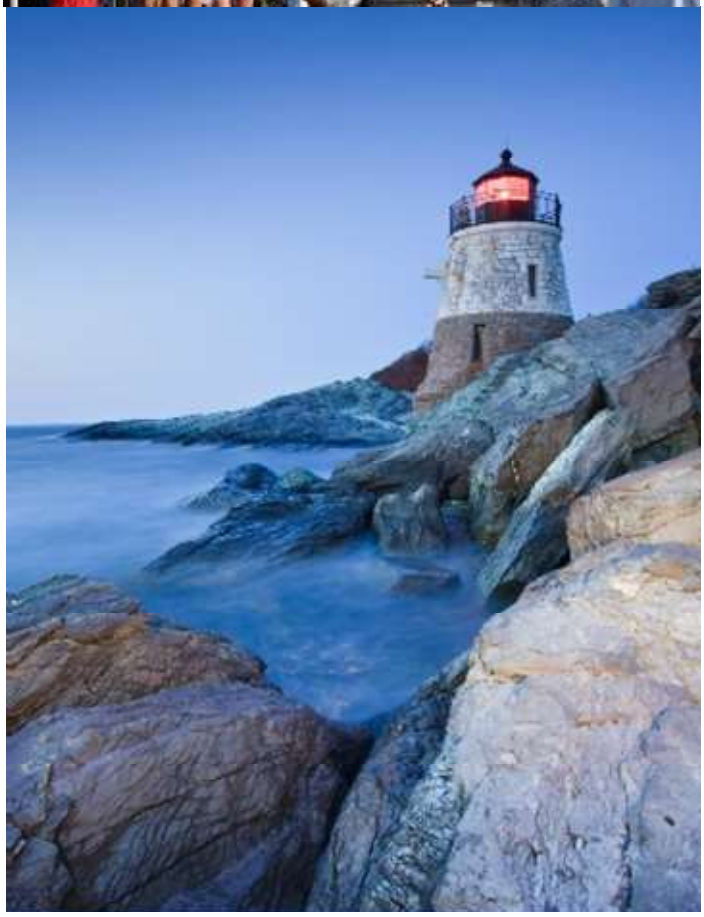

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